The influence of electrochemically exfoliated graphite/TiO_2 material on the surface resistivity and photocatalytic characteristics of leather

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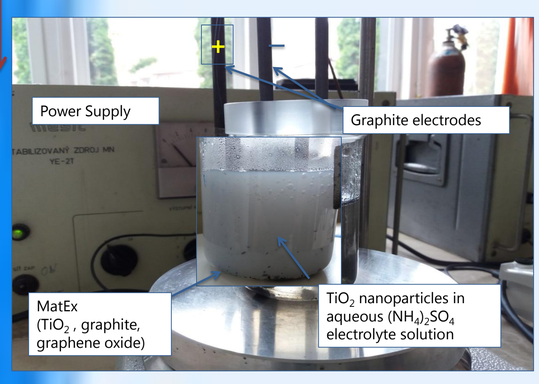
BACKGROUND & MOTIVATION

Modification textiles and leather materials via incorporation of organic additives / inorganic nanostructures for daily and professional use items gained a great attention in recent years. Thus, new characteristics can be added to fabrics, such as self-cleaning, anti-microbial, hydrophobic-hydrophilic and electrical conductivity. In this respect, coatings containing titanium dioxide-based composites are used to develop multifunctional textiles and leather materials.

EXPERIMENTAL

Preparation of TiO_2-based composite (MatEx) by electrochemical exfoliation of graphite

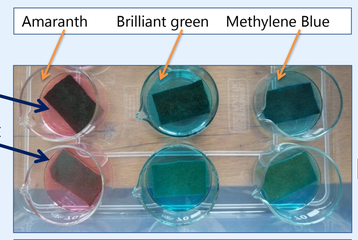


MatEx coating on leather specimens (5 x 3 cm)

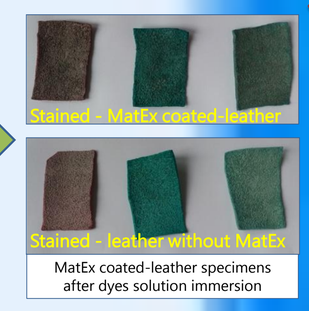
Staining the MatEx coated leather specimens

MatEx coated-leather

Leather without MatEx

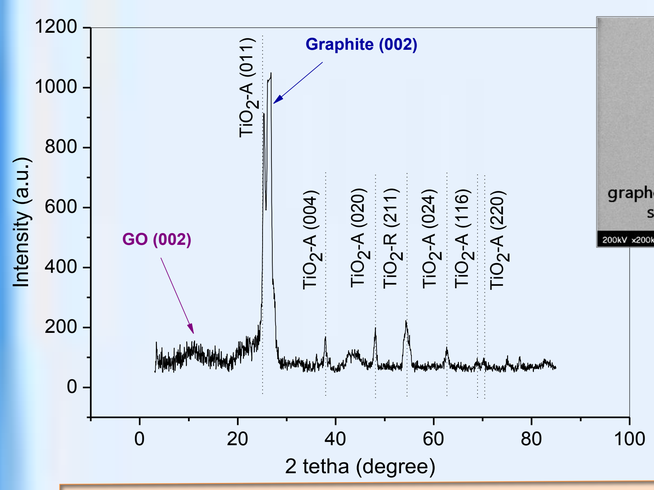


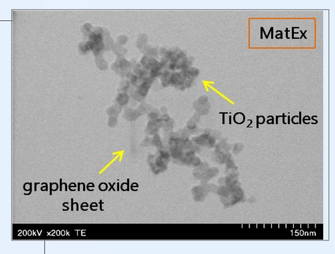
Immersion of leather specimens in 3 x 10^{-5} M solution of different dyes: amaranth, brilliant green and methylene blue



MatEx coated-leather specimens after dyes solution immersion

Morpho-structural characterization of MatEx

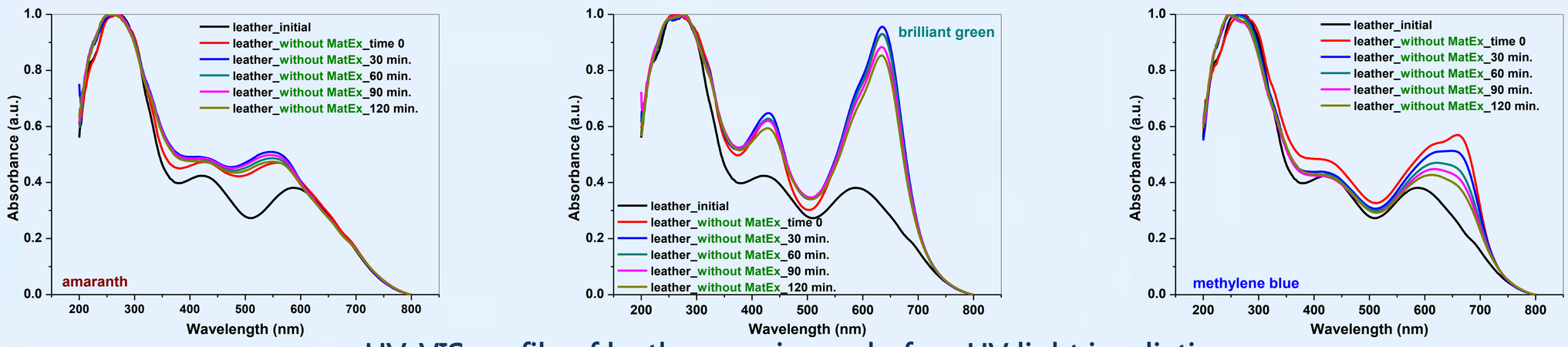




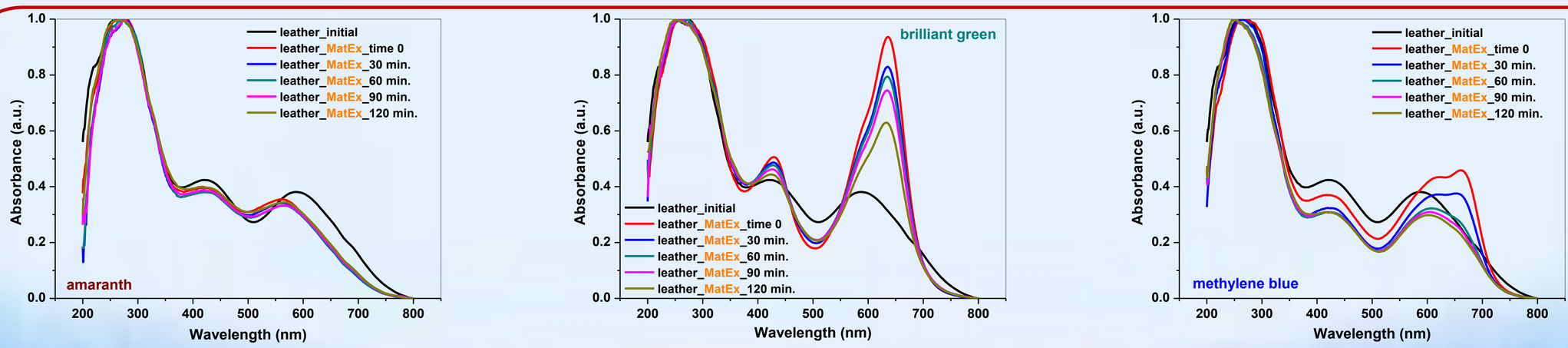
Surface resistivity *(GΩ/sq) of leather specimens*

Specimen	Surface resistivity (GΩ/sq)
MatEx coated-leather specimen	152
Amaranth stained-leather specimen	294
MatEx coated and Amaranth stained-leather specimen	340
Brilliant Green stained-leather specimen	282
MatEx coated and Brilliant Green stained-leather specimen	550
Methylene Blue stained-leather specimen	430
MatEx coated and Methylene Blue stained-leather specimen	617

Photocatalytic experiments



UV-VIS profile of leather specimens before UV light irradiation



UV-VIS profile of leather specimens after exposure to UV light irradiation (OSRAM VITALUX 300 W) for 120 minutes

CONCLUSION

Promising TiO_2-based composite (MatEx) with improved photocatalytic activity as coating material for treated leather was prepared. The experimental results showed that the surface resistivity of the leather specimens increased in following order: MatEx coated leather < colored leather < MatEx coated and colored leather. Moreover, the photocatalytic activity study revealed that the MatEx coating accelerates the dye degradation, its efficiency being dependent on the structure of dye.

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